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This study examines some effects of class size upon pupil achievement by statistical comparisons of student achievement tests in 95 school systems. Areas investigated include (1) whether a measurable relationship can be found between the size of classes in a school district and the academic achievement of the pupils in the district, (2) whether the relationships between class size and scholastic achievement are the same for pupils of different academic potential, (3) whether the size-achievement relationships are the same in various subject areas, (4) whether magnitudes of the size-achievement relationships vary when different kinds of class size measures are used, (5) whether the size-achievement relationships are the same for districts of different size, and (6) whether the size-achievement relationships are the same from grade to grade. Evidence leads to the conclusion that there is a small inverse relationship between academic achievement and class size which is subject to qualifications discovered in investigating areas two through six. A number of complex factors tending to distort or color the relationships were discovered. (TT)

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Effect of Class Size as Measured by an Achievement Test Criterion

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Past studies of the relationship between class size and pupil achievement, as reflected in the literature, have often been inconclusive; and those studies which appear to be conclusive are not always in agreement with one another.

The examination of the relationship between class size and pupil achievement was undertaken in this study to gain insight into some of the factors which might have a bearing upon the relationship.

To achieve this end, this study sought answers to four key questions, plus several closely related questions, by means of a statistical comparison among 95 school systems. The results are organized and presented here in terms of these key questions. While the data do not furnish ineluctable proof of the validity of the statements which follow, the weight of evidence does support them.

The Achievement Test Residual as a Criterion

The criterion of pupil achievement used in this study was based upon a survey of test results in 95 school districts of the Metropolitan School Study Council, the Associated Public School Systems and the Central School Study. All of the participant districts employ in their regular elementary school testing programs one of the four following achievement test batteries: the California Achievement Test, the Iowa Test of Basic Skills, the Metropolitan Achievement Test, or the Stanford Achievement Test. Only arithmetic and reading subtests were used in this comparison, plus the composite score from the total test battery.

Scores of fourth and sixth grade pupils on whatever test was given were obtained and converted to standard scores. In addition to the achievement test data, results of the Otis Intelligence Test Scale were obtained and residuals computed. This was done by predicting the achievement test score from the intelligence test score through the use of a standard regression equation as supplied by the test makers of the various tests. The difference between the predicted score and the actual score on the achievement test (the residual) was used as the criterion against which to examine the class size data. These residuals were converted to standard scores of M = 500 and sigma = 100. Thus a pupil whose predicted score is identical with his actual achievement test score has a criterion score of 500. A pupil whose actual score is superior to his predicted score has a criterion score above 500, and a pupil whose actual score fails to reach the predicted level falls below 500 by whatever degree the difference turns out to be.

School district scores for the fourth and sixth grades were then obtained by averaging the residuals (or individual criteria) of pupils in each of the grades for each district. Pupils were further classified into a high ability group (IQ above 116 on the Otis scale) a middle ability group (IQ 85 to 116) and a low ability group (IQ below 85).

All regular pupils taught in regular self-contained academic classes were included in the criterion, except for pupils who had been enrolled for less than one full academic year. The latter pupils were eliminated from

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the criterion scores, though they were included in computing the size variables.

Eight size variables were computed. Two of these variables, number of pupils per grade and number of classes per grade, were measures of school system size. Five of the size variables were direct or indirect measures of class size. These were average class size, size of smallest class, size of largest class, percent of classes with less than 22 pupils and percent of classes with more than 27 pupils. The eighth size variable, class size range, was computed as the difference between the number of pupils in the largest class and the number of pupils in the smallest class in the school district.

It will be seen therefore that the intent in computing class size variables is to arrive at some measure of class size policy within the district. Thus the results of the study reflect this system-wide condition, and should be so interpreted, rather than an analysis of a one-for-one relationship between the class size scale and the achievement test scale. The results of this analysis may be examined in the accompanying tables.

Class Size and Achievement

One of the questions to which this study addressed itself was, Does the class size practice of a school district reflect itself in the academic achievement of its pupils?, or, What, if any, measurable relationship can be found between the size of classes in a school district and the academic achievement of the pupils in the district?

The data support the conclusion that there is a small inverse relationship between the size of classes in a district and the academic achievement of its pupils as predicted by a measure of academic potential.

If this relationship were random, approximately half of the correlations run between measures of academic achievement and class size would have favored an inverse relationship and half would have favored a direct relationship. However, the data from all thirty-six criteria and all twenty-four samples studied represented a ratio of nine to one favoring the inverse relationship over the direct relationship. Without exception, correlation coefficients between the average class size of districts and their criterion values which showed some degree of statistical significance represented an inverse relationship.

The differences of means tests run in this study also favored a small inverse relationship between school district class size and academic achievement of its pupils. School districts in the upper third of the class size distribution had mean criterion values less than the mean values for those districts in the lower third of the class size distribution. When the roles of the criteria and size variables were reversed in the comparison of means procedure, the data still supported the conclusion, but not as strongly.

However, the pattern of the data from variable to variable and sample to sample was not universally consistent in support of the conclusion that there is a small

TABLE 1

COEFFICIENTS OF CORRELATION BETWEEN SIZE VARIABLES AND CRITERION VALUE FOR THE FOURTH AND SIXTH GRADES 95 SCHOOL SYSTEMS

Criterion Variable		Size Variable							
Type of Test	Pupil Ability Level	Number of Classroom Teachers in District	Number of Pupils in District	Class Size Range in District	Average Class Size	Size of Smallest Class in District	Size of Largest Class in District	% of Classrooms in District With Less Than 22 Pupils	% of Classrooms in District With More Than 27 Pupils
Arithmetic	low	—.0894	—.1231	—.0367	—.1263	—.0431	—.1051	.1385	—.2019*
Arithmetic	middle	—.0721	—.0898	—.0718	—.0030	.0684	—.0107	.0286	—.0791
Arithmetic	high	—.1285	—.1370	—.0146	.0346	.0500	.0437	—.0439	.0514
Arithmetic	all	—.1204	—.1293	—.0642	.0161	.0696	.0011	.0020	—.0395
Reading	low	—.0700	—.0994	—.0367	—.2169**	—.1035	—.1821*	.2581**	—.3004**
Reading	middle	.0557	.0256	.0315	—.1947*	—.1085	—.0954	.1555	—.2055**
Reading	high	—.0309	—.0394	.0157	—.0777	—.0590	—.0538	.0232	—.0121
Reading	all	.0066	—.0177	.0458	—.1647	—.1045	—.0707	.1286	—.1493
Composite	low	—.0900	—.1255	—.0398	—.1897*	—.0817	—.1586	.2365**	—.2367**
Composite	middle	—.0394	—.0632	—.0194	—.0936	—.0181	—.0495	.1050	—.1333
Composite	high	—.0771	—.0863	.0112	—.0647	—.0338	—.0279	.0331	.0039
Composite	all	—.0608	—.0803	.0050	—.0932	—.0351	—.0378	.0953	—.0952

* Significant at .10 level.
** Significant at .05 level or better.

TABLE 2

COEFFICIENTS OF CORRELATION BETWEEN SIZE VARIABLES AND CRITERION VALUES FOR THE SIXTH GRADE 95 SCHOOL SYSTEMS

Criterion Variable		Size Variable							
Type of Test	Pupil Ability Level	Number of Classroom Teachers in District	Number of Pupils in District	Class Size Range in District	Average Class Size	Size of Smallest Class in District	Size of Largest Class in District	% of Classrooms With Less Than 22 Pupils	% of Classrooms With More Than 27 Pupils
Arithmetic	low	—.0984	—.1266	.0475	—.1209	—.0668	—.0076	.1468	—.0355
Arithmetic	middle	—.1805*	—.1870*	—.1355	.0210	.1428	—.0384	.0194	—.0230
Arithmetic	high	—.0529	—.0629	—.0820	.0044	.0684	—.0459	—.0533	—.0677
Arithmetic	all	—.1797*	—.1891*	—.1367	—.0076	.1222	—.0664	.0444	—.0276
Reading	low	—.0488	—.0811	.0491	—.1767*	—.0949	—.0404	.2679**	.0266
Reading	middle	—.1149	—.1245	—.0542	—.0106	.0933	.0302	.0436	—.0206
Reading	high	—.0128	—.0426	.1396	—.1716*	—.1734*	.0065	.1683	—.1834*
Reading	all	—.0828	—.1039	.0280	—.0817	—.0154	.0258	.1209	—.0627
Composite	low	—.1050	—.1397	.0084	—.1312	—.0248	—.0177	.1747*	—.0437
Composite	middle	—.1613	—.1727	—.1327	.0035	.1499	—.0323	.0476	—.0348
Composite	high	—.0576	—.0855	0.0000	—.1752*	—.0836	—.1055	.1091	—.1788*
Composite	all	—.1611	—.1774	—.1078	—.0487	.0922	—.0575	.0765	—.0531

inverse relationship between scholastic achievement of pupils and class size. These inconsistencies are analyzed in light of the other key questions to which this study addressed itself.

Variation by Academic Potential

The second key question for this study was, Are the relationships between class size and scholastic achievement the same for pupils of different academic potential? In this study, the question was framed in terms of a comparison between three groups of pupils—those with I.Q.'s between 85 and 116 on the Otis scale and the two extreme groups falling above or below this middle group.

The data supported the conclusion that the relationships between class size measures and scholastic achievement criteria were not the same for pupils of different academic potential.

The pattern for the low ability pupils was significantly different from the patterns for each of the other pupil ability groups. Based on the data from all samples, the number of significant correlations which involved the low ability pupils outnumbered the average number of such correlations which involved the other two groups by an average of four to one.

Further, while some of these correlations represented a direct, rather than inverse, relationship between class size variables and criteria, none of these, involved low potential pupils. All significant correlations involving low ability pupil criteria exhibited an inverse relationship between class size and academic achievement of pupils.

The difference of means findings supported the correlation findings. By a ratio of three to two, more of the statistically significant differences of means involved low ability pupils than either of the other two ability groups. All of the significant differences involving the low potential students represented an inverse relationship between class size and achievement criteria.

The differences between the way the "middle ability pupil criteria" and the "high ability criteria" related to the class size measures was very slight. This was true for both the data based upon the correlation runs and the data based upon the difference of means runs. This finding was important from the standpoint of the "ceiling effect." The logical assumption would have been that the high potential students would have been more limited by the "ceiling effect," or would have tended to "top out" more often than the middle ability pupils. Yet, the number of significant differences of means tests and the number of significant correlation coefficients were about equal for the two groups of pupils, with only a slightly larger number of significant statistics involving high potential students than the number of significant statistics involving the middle ability pupils.

Thus it could not be assumed that the "ceiling effect" completely accounted for the different degrees to which the three pupil ability groups related to class size variables. Nor was the weight of the evidence sufficiently clear to conclude that the scholastic achievement of the lower ability pupil was influenced to a greater extent by the size of the class in which he studied than was the achievement of the student of higher academic potential.

Variation by Subject

The third major question which this study sought to probe was, Are the relationships between class size and scholastic achievement the same in various subject areas? More specifically, this study investigated the relationship between class size measures and three tests of academic achievement—tests of arithmetic and reading and the composite test score for the entire battery.

The weight of evidence in this study led to the conclusion that there were differences in the manner in which the academic subject areas related to the school district size variables.

One fourth of the correlation coefficients significant at or above the 75th percentile of non-fortuitous probability which involved arithmetic test criteria represented a direct, rather than inverse, relationship between these criteria and measures of class size. All of the reading test criteria significantly correlated with class size variables, on the other hand, expressed an inverse relationship. Also, the number of significant reading test criteria inversely related to class size measures outnumbered those involving arithmetic test criterion values by 49 to 33. These findings were based upon all correlation data from all samples in the study.

The findings based upon all differences of means tests run also supported this conclusion. Fifty-two of the differences involved reading test criteria while only thirty-three represented arithmetic criteria. All eighty-five show an inverse relationship between criteria and class size.

It was also clear from the data that the arithmetic test criteria were far more often related to district size than were reading test criteria. There were twenty-four significant differences of means involving district size and arithmetic test criteria while only eight significant differences involved district size and reading test criteria.

The composite test criteria based upon the entire achievement test battery did not relate to the class size measures any more highly than those criteria based upon the reading sub-test or the arithmetic sub-test alone. In fact, those significant correlations which involved composite test criteria tended to occur in runs which had high loadings of significant reading and/or arithmetic criterion values. The difference of means tests supported the same conclusion.

Differences in Class Size Measures

The fourth key question which this study sought to explore was, Do the magnitudes of these relationships (between criteria of scholastic achievement and class size measures) change when different kinds of class size measures are used?

Differences were found in the magnitude of the relationship between criteria and size variables as represented by different forms of class size measurements. The measurements "class size range," "size of smallest class" and "size of largest class" neither exhibited significant correlations nor produced meaningful differences of means in conjunction with the criterion values at a frequency greater than might have resulted from chance error. The pattern of significant correlation involving these measures was also random except for a slight tendency for the MSSC member districts to exhibit a small inverse relationship between "size of smallest class" and criteria, and for the arithmetic criteria for all 95 districts to show a positive relationship with "size of smallest class."

The "percent of classes with less than 22 pupils" correlated significantly more often with the criteria than any of the other measures of class size. For all sample groups taken together, there were forty-nine correlations involving "percent of classes with less than 22 pupils" which were significant at or above the .25 level. This compared with a total of twenty-seven such correlations involving the "average class size variable" and thirty-two such correlations involving the "percent of classes with more than 27 pupils size variable."

All such correlations which involved the "average class measure" represented an inverse relationship with criteria. However, seven of the significant correlations with the "percent of classes with less than 22 pupils measure" and four of the significant correlations with the "percent of classes with more than 27 pupils variable" represented a direct relationship with criteria. These correlations which represented a direct relationship between citeria and class size variables were primarily associated with the arithmetic test criteria of the CSS and APSS districts.

The pattern of the "percent of classes in the upper and lower quartile measures respectively" as compared to the pattern of the "average class size variable" for all data runs would indicate that these variables were apparently measuring different aspects of the class size/pupil achievement relationship.

In addition to the four key questions which this study was committed to explore, two additional questions arose out of the study itself. When this study was planned, it was thought that these two questions would be subsidiary to the four key questions to which the study was

TABLE 3

DIFFERENCE OF MEANS BETWEEN UPPER AND LOWER THIRDS OF RANK ORDERED DISTRIBUTION FOR AVERAGE CLASS SIZE AND CRITERION VALUES FOR FOURTH AND SIXTH GRADES OF 95 SCHOOL SYSTEMS

Criterion Variable		Criterion Scores by Class Size				Class Size Average by Criterion Scores			
Type of Test	Pupil Ability Level	Mean Criterion Score of Districts in Lower Third of Class Size Range		Mean Criterion Score of Districts in Higher Third of Class Size Range		Mean Class Size of Districts in Lower Third of Criterion Range		Mean Class Size of Districts in Higher Third of Criterion Range	
		Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade
Arithmetic	low	542.40	523.59	510.38**	514.14	25.41	24.90	23.81*	24.59
Arithmetic	middle	528.11	517.73	515.22	517.68	25.26	24.85	24.62	24.55
Arithmetic	high	508.40	496.63	499.92	492.31	25.01	25.02	24.90	24.67
Arithmetic	all	518.53	514.37	509.16	509.67	25.11	24.85	24.46	24.38
Reading	low	546.77	513.00	514.41**	504.67	25.52	25.08	23.24**	24.26
Reading	middle	530.00	504.87	501.61**	506.83	25.62	24.39	24.03*	24.48
Reading	high	523.01	502.35	508.56	486.73*	24.85	25.40	24.58	23.44**
Reading	all	527.81	503.49	502.67**	500.28	25.39	24.80	23.94	24.18
Composite	low	543.11	522.49	512.05**	515.98	25.49	24.97	23.92*	25.08
Composite	middle	526.33	515.22	507.48**	516.25	25.04	24.56	24.17	24.78
Composite	high	514.57	499.22	500.09	488.57*	24.60	24.53	24.62	24.67
Composite	all	522.64	509.10	504.77**	506.83	25.10	25.13	24.34	24.43

TABLE 4

DIFFERENCES OF MEANS BETWEEN THE UPPER AND THE LOWER THIRDS OF DISTRIBUTION FOR THE PERCENTAGE OF CLASSES WITH LESS THAN 22 PUPILS AND THE CRITERION VALUES, FOURTH AND SIXTH GRADES OF ALL 95 SCHOOL SYSTEMS

Criterion Variable		Percentage of Classes Under 22				Criterion Scores			
Type of Test	Pupil Ability Level	Mean Criterion Score, Districts in Lower Third of Range		Mean Criterion Score, Districts in Upper Third of Range		Lower Third of Criterion Range, Mean Percent of Classes with Less than 22		Upper Third of Criterion Range, Mean Percent of Classes with Less than 22	
		Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade
Arithmetic	low	514.37	518.25	540.56**	530.87	22.93	21.18	33.82*	31.61*
Arithmetic	middle	519.62	522.69	526.80	515.39	24.82	21.94	29.06	26.74
Arithmetic	high	503.07	499.38	508.35	488.50	22.46	23.04	27.81	24.14
Arithmetic	all	512.52	514.79	520.47	509.56	24.72	21.40	32.45	29.42
Reading	low	511.86	502.37	544.23**	520.54**	24.77	18.13	39.40**	33.45**
Reading	middle	507.50	504.76	530.03**	504.00	21.95	27.33	32.25*	26.01
Reading	high	506.78	486.69	520.06	502.03*	26.50	14.59	26.81	32.35**
Reading	all	505.72	497.88	527.02**	503.29	21.53	19.12	34.08*	31.20*
Composite	low	512.40	517.62	541.56**	526.17	20.39	19.91	32.78**	27.49
Composite	middle	510.20	517.61	524.55*	513.20	24.55	26.03	33.80	26.94
Composite	high	498.10	491.79	512.21	494.99	27.25	24.36	29.84	24.98
Composite	all	505.60	508.43	520.73*	506.34	23.08	20.81	31.82	26.93

addressed. However, as the study progressed, these two questions seemed to loom as large as the original four questions; and further, the findings from this study appeared to throw some light upon these two questions.

Differences by District Size and Grade Level

One of these two questions was, Are the relationships between class size and academic achievement the same for districts of different size? Does district size reflect itself in the relationship between scholastic achievement and class size?

The weight of evidence from this study supported the conclusion that there is a relation between district size and the criterion of pupil achievement. In the case of the CSS member districts, this relation, as measured by the arithmetic and composite test criteria, was the reverse of that found for the members of either of the other two school study councils. That is, a significant relationship between class size measures and criteria of achievement could not be measured in the case of the small, more sparsely populated school districts which comprise the CSS council.

TABLE 5

DIFFERENCES OF MEANS BETWEEN UPPER AND LOWER THIRDS OF DISTRIBUTION FOR THE PERCENTAGE OF CLASSES WITH MORE THAN 27 PUPILS AND THE CRITERION VALUES, FOURTH AND SIXTH GRADES OF 95 SCHOOL SYSTEMS

Criterion Variable		Percentage of Classes Over 27				Criterion Scores			
Type of Test	Pupil Ability Level	Mean Criterion Score, Districts in Lower Third of Range		Mean Criterion Score, Districts in Upper Third of Range		Lower Third of Criterion Range, Mean Percent of Classes with More than 27		Upper Third of Criterion Range, Mean Percent of Classes with More than 27	
		Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade	Fourth Grade	Sixth Grade
Arithmetic	low	541.48	522.62	507.53**	523.93	28.80	26.89	17.34*	30.16
Arithmetic	middle	526.52	521.91	514.26	526.76	32.62	31.80	24.65	28.49
Arithmetic	high	498.89	498.67	507.64	504.64	28.78	29.92	29.63	26.19
Arithmetic	all	517.05	514.16	511.14	519.80	29.37	30.72	21.96	27.90
Reading	low	540.52	506.06	509.54**	509.52	33.59	27.61	14.11**	26.34
Reading	middle	522.43	506.30	504.70*	507.30	34.59	27.99	19.35**	28.33
Reading	high	507.95	491.93	516.30	499.78	27.76	31.54	27.92	16.01**
Reading	all	517.52	501.19	508.79	502.98	32.23	29.44	18.89*	26.86
Composite	low	537.89	518.32	510.14**	520.64	29.57	28.77	17.56**	31.25
Composite	middle	519.34	516.57	508.50	519.26	31.58	28.21	19.54*	29.57
Composite	high	499.00	491.81	506.27	501.81	23.64	26.57	27.51	30.64
Composite	all	512.21	507.81	507.78	511.71	31.74	30.17	21.29	25.38

The data also revealed that the interplay between district size and class size was greater in relation to the arithmetic criteria than in relation to the reading criteria.

This is not to conclude that class size and district size are a simple function of one another. On the contrary, the pattern of loadings for both the correlation and difference of means runs demonstrated that the district size and class size measures could, and usually did, load independently of one another, both within samples and among samples.

The additional question of concern to this study was, Are the relationships between class size and academic achievement of pupils the same from grade to grade? The weight of the evidence suggested that the answer is "no." The comparison between fourth and sixth grade statistics on all four samples used in the correlation runs supported this conclusion. Also, comparisons between the findings from Tables 3, 4 and 5 all supported the same conclusion.

This difference from one grade level to another has been previously reported in the literature. There, as is the case of this study, the achievement of pupils in the higher grade or grades tended to be less closely related to class size than the achievement of pupils in the lower grades.

Conclusions

It may be concluded from the weight of the evidence in this study that there is a small inverse relationship between the academic achievement of pupils and class size; but:

1. This relationship tends to be smaller for pupils of higher scholastic potential than for pupils of lower scholastic potential.

2. This relationship tends to be smaller for criteria based upon total achievement test batteries or arithmetic sub-tests than criteria based upon reading sub-tests.

3. This relationship tends to be more uncertain of measurement at the sixth grade level than at the fourth grade level.

4. This relationship reflects an interplay with school district size. The relationship was essentially obliterated with a group of small, relatively sparsely populated, school districts. However, there was little evidence that district size *per se* reflected itself in the magnitudes of the achievement criteria.

5. All of these conclusions are subject to the kinds of class size measures used. The findings from this study raise the possibility that the practice of using "average class size" as the lone measure of class size tends to oversimplify the study of the relationship with pupil achievement.

In the final analysis, this study should shed some light on the interpretation of previously reported studies of the class size question. The findings from this study documented the fact that the relationship between pupil achievement and class size is not a simple one. This study has identified a number of important factors which would distort or color this relationship. These factors must be kept in mind when the results from studies of the class size question are analyzed. If these factors are kept in mind, some of the reasons for the apparent inconclusiveness and/or the seemingly contradictory nature of previously reported studies may be explained.

Coefficients of determination (R^2) and correlation (R) adjusted for the number of regression constants fitted1/ are given below:

	R^2	R
Whites	.4008	.63
Non-whites	.3680	.61

The standard deviations of student verbal scale scores about the regression surface are as follows:

	Degrees of Freedom	Error Variance	Error Std. Deviation
8% Sample			
Whites	5282	80.61	8.98
Non-whites	3555	50.84	7.13
Pooled	8837	68.63	8.28
All Survey Students	111,989	71.79	8.47

A total of 125,170 sixth grade students were in the EEO Survey. Of these 13,180 (10.53%) were excluded from our study because they failed to meet the criteria discussed in Sections A.4.1 and A.4.2 regarding low test scores and high proportions of missing background data. A verbal scale score was predicted and the algebraic difference between the actual and predicted score was determined for each of the remaining 111,990 students. As shown in the last line of the above table, the standard deviation of these differences is only slightly higher than the corresponding standard deviation for the 8958 students whose data was used to estimate the regression coefficients (8.47 vs. 8.28). A slightly higher standard deviation would be expected due to some imprecision in the estimated values of the regression coefficients.

1/ Adjusted $R^2 = 1 - (1-R^2)(N-1)/(N-M)$, where N = sample size and M = no. of constants fitted. See Ezekial and Fox, Methods of Correlation and Regression Analysis, Third Edition, p. 300.

Table A-1

Value Assignments for Numerically Scaled Variables

	Question Number	Degree	Numerical Value Assignments										No. of Variables	Variable Number(s)
			A	B	C	D	E	F	G	H	I	J		
1	1	Linear	1	2									1	5
2	2	Quadratic	1	2	3	4	5						2	6,33
3	7 1/	"	1	2	3	4	5	6	7	8	9	10	2	7,34
4	8	"	1	2	3	4	5	6	7	8	9	10	2	8,35
5	10	Linear	1	2	2	2	2	2	2	2			1	9
6	11	"	1	2	3	4	5	5	5	5	1		1	2
7	14	"	1	2	3	4	5	5	5	5	1			
8	16	"	1	2						-			1	3
9	17	"	1	2										
10	18	"	1	2	3	4	1.5						1	10
11	19	"	1	2									1	11
12	20	"	1	2									1	12
13	21	"	1	2									1	13
14	22	"	1	2									1	14
15	25	"	1	2									1	15
16	26	"	1	2									1	16
17	27	"	1	2									1	17
18	28	Quadratic	1	2	3	4	6						2	18,36
19	29	"	0	0.5	1	1.5	2	3	5				2	19,37
20	30	Cubic	1	2	3	4	5						3	20,38,43
21	32	Quadratic	1	2	3	4	5						2	21,39
22	35	Linear	1	3	2								1	22
23	36	"	1	2									1	23

Table A-1 (cont.)

Value Assignments for Numerically Scaled Variables

	Question Number	Degree	Numerical Value Assignment										No. of Variables	Variable Number(s)
			A	B	C	D	E	F	G	H	I	J		
24	37	Linear	1	2									1	24
25	40	Quadratic	1	1	2	3	4						2	25,40
26	41	Linear	1	1	2	3	2						1	4
27	42	"	1	1	2	3	2							
28	44	Quadratic	1	2	3	4	5						2	26,41
29	45	Linear	1	2									1	27
30	47	"	1	2	3								1	28
31	48	"	1	2	3	4	6						1	29
32	51	"	1	1	1	1	2						1	30
33	52	Quadratic	1	2	3	4	5	3					2	31,42
34	54	Linear	1	2	3	4							1	32
TOTAL													42	

1/ No. of adults in home derived from answers to questions 7 and 8.

Table A-2

Dummy (Artificial) Variables

	Question No.	Answer Groupings1/ 1	2	3	4	5	No. of Variables	Variable No(s)
1	3	A=B	C	D=E=F=G	H=NR		3	44,45,46
2	4-6	White Negro	Oriental P.R.	Mexican	Indian	Other	1 4	77 77,78,79,80
3	9	A	B	C=D=E=F =G=H=NR			2	47,48
4	12	A=E=F=J	B=C=I	D=G=H	K=NR		3	49,50,51
5	13	A	B	C=D=E=F	G=NR		3	52,53,54
6	15	A	B=NR	C			2	55,56
7	23	A	B	C=NR			2	57,58
8	24	A	B	C=NR			2	59,60
9	33	A	B	C=NR			2	61,62
10	34	A	B	C=NR			2	63,64
11	38	A	B=NR	C	—		2	65,66
12	39	A	B=NR	C			2	67,68
13	46	A	B	C=NR			2	69,70
14	49	A	B=NR	C	D=E		3	71,72,73
15	Boy: 53 Girl:	B=C=I equals B=F	A=E=F=J equals A=D=G	D=G=H equals C=E=H=I=J	K=NR equals K=NR		3	74,75,76
							34(37)	

1/ Form (k=1) dummy variables from k groupings.E.g.,Q3

Answer	X44	X45	X46
A,B	1	0	0
C	0	1	0
D,E,F,G	0	0	1
H,NR	0	0	0

Table A-3

Regression Equation Coefficients

Variable No.[1]/	Whites			Non-whites		
	Coefficient[2]/	Std. Error	F	Coefficient[2]/	Std. Error	F
Constant	238.5			229.3		
2	0.225	.048	21.8***	(-0.001)	.803	0.0
3	1.066	.236	20.4***	0.473	.195	5.9*
4	(.006)	.899	0.2	-0.159	.125	1.6
5	(0.013)	.928	0.9	0.345	.251	1.9
6	4.592	1.175	15.3***	1.967	.847	5.4*
7	(-0.001)	.070	0.0	0.453	.307	2.2
8	-0.430	.080	28.8***	-0.339	.061	30.6***
9	-1.410	.568	6.2*	-1.804	.351	26.4***
10	0.337	.143	5.5*	0.255	.128	4.0*
11	(-0.004)	.911	0.1	(-0.007)	.776	0.2
12	-1.251	.431	8.4**	-0.294	.283	1.1
13	(-0.009)	.865	0.5	-0.394	.302	1.7
14	-6.158	.940	42.9***	-2.390	.431	30.8***
15	-1.485	.544	7.4**	-1.105	.283	15.3***
16	-0.840	.437	3.7	-0.888	.278	10.2**
17	(-0.014)	.821	1.1	(-0.006)	.822	0.1
18	0.780	.072	116.8***	0.515	.360	2.0
19	1.314	.422	9.7**	1.028	.372	7.7**
20	-0.648	.269	5.8*	0.648	.265	6.0*
21	1.478	.581	6.5*	1.761	.544	10.5**
22	(0.001)	.934	0.0	0.473	.139	11.7***
23	(0.004)	.902	0.1	(0.001)	.895	0.0
24	0.747	.261	8.2**	1.020	.251	16.5***
25	-6.394	.700	83.4***	-1.246	.655	3.6
26	0.959	.141	46.4***	0.889	.476	3.5
27	-0.887	.283	9.8**	-1.032	.266	15.0***
28	(-0.011)	.956	0.6	-0.430	.374	1.3
29	-0.314	.128	6.0*	-0.448	.092	23.8***
30	1.487	.333	19.9***	2.007	.287	48.8***
31	5.658	.927	37.2***	2.537	.442	32.9***
32	0.408	.133	9.4**	0.361	.125	8.3**
33	-0.964	.181	28.4***	-0.392	.123	10.1**
34	-0.081	.017	24.0***	-0.106	.033	10.6**
35	(0.006)	.071	0.2	(-0.002)	.060	0.0
36	(0.004)	.032	0.1	-0.058	.048	1.5
37	-0.274	.066	17.3***	-0.119	.060	4.0*
38	(-0.006)	.001	0.2	(-0.027)	.001	2.5
39	-0.328	.088	13.9***	-0.271	.082	10.9***
40	1.001	.158	39.9***	0.142	.143	1.0
41	(0.012)	.027	0.8	-0.063	.082	0.6
42	-0.834	.122	46.6***	-0.387	.075	26.3***

Table A-3 (cont.)

Regression Equation Coefficients

Variable No.[1]	Whites			Non-whites		
	Coefficient[2]	Std. Error	F	Coefficient[2]	Std. Error	F
43	0.016	.009	3.0	-0.025	.009	7.4**
44	1.668	.775	4.6*	1.371	.570	5.8*
45	2.797	.832	11.3***	1.572	.659	5.7*
46	2.557	1.042	6.0*	1.168	.731	2.6
47	(0.016)	.831	1.3	(0.009)	.779	0.3
48	(-0.012)	.943	0.8	(-0.007)	.928	0.2
49	(0.014)	.771	1.0	0.968	.339	8.2**
50	2.184	.301	52.8***	1.114	.416	7.2**
51	(0.001)	.810	0.0	0.829	.317	6.8**
52	1.722	.428	16.2***	1.158	.298	15.1***
53	2.604	.468	31.0***	2.072	.350	35.1***
54	1.754	.650	7.3**	(0.003)	.560	0.0
55	-0.711	.321	4.9*	-0.490	.290	2.9
56	-1.022	.339	9.1**	-0.236	.299	0.6
57	0.707	.532	1.8	1.526	.546	7.8**
58	(0.012)	.260	0.7	0.710	.612	1.3
59	5.030	.678	55.0***	2.869	.434	43.8***
60	4.559	.709	41.3***	2.075	.431	23.1***
61	-0.837	.319	6.9**	-0.216	.262	0.7
62	(0.006)	.694	0.2	(0.004)	.692	0.1
63	-0.711	.310	5.3*	-0.438	.292	2.3
64	-1.258	.491	6.6*	-1.314	.428	9.4**
65	-5.414	.475	130.2***	-3.424	.347	97.4***
66	-3.762	.294	163.4***	-3.069	.286	114.9***
67	-1.809	.266	46.4***	(-0.001)	.269	0.0
68	(0.003)	.238	0.0	1.180	.267	19.5***
69	1.610	.505	10.2**	0.566	.442	1.6
70	1.120	.388	8.3**	1.453	.313	21.6***
71	(0.013)	.892	0.9	1.503	.676	4.9*
72	(-0.000)	.396	0.0	1.727	.553	9.7**
73	0.627	.294	4.5*	1.804	.569	10.0**
74	0.616	.277	4.9*	(-0.008)	.426	0.3
75	(-0.008)	.509	0.4	-0.379	.276	1.9
76	-0.907	.388	5.5*	-1.048	.337	9.7**
77	(0.002)	.904	0.0	-2.177	.520	17.5***
78				-2.904	.673	18.6***
79				-1.910	.575	11.0***
80				0.857	.672	1.6

1/ See Tables A-1 and A-2 for identification and scaling of variables.

2/ Terms corresponding to coefficients enclosed in parentheses were dropped from the regression model; i.e., true values of these coefficients were assumed to be zero. If one of these variables were added to the model, the regression coefficient would be as shown.

*, **, and *** indicate that regression coefficient differs significantly from zero at .05, .01, and .001 levels, respectively.

A P P E N D I X B

Schools and School Districts Having Extreme Adjusted Achievement Differentials

Table B-1

100 Schools with Highest Adjusted Achievement Differential Values

School Rank	Adj. $\bar{d}$	Mean Score		Std. Dev'n of d's	No. of Students	Proportion Non-White
		Actual	Predicted			
1	12.3	259.1	240.3	4.76	25	0.960
2	9.0	250.9	238.4	5.78	34	1.000
3	8.6	251.3	240.9	9.69	67	0.985
4	8.0	269.1	250.5	7.30	10	0.000
5	7.4	250.1	238.3	9.02	22	1.000
6	6.9	268.7	260.0	9.42	51	0.098
7	6.8	247.2	238.5	11.11	50	0.960
8	6.6	265.3	258.2	10.03	160	0.025
9	6.4	264.0	256.9	9.34	126	0.127
10	6.2	250.6	242.7	9.45	51	0.902
11	6.2	247.1	238.5	10.20	34	0.941
12	6.2	257.3	240.9	7.14	8	1.000
13	6.0	262.4	245.0	3.68	7	1.000
14	5.7	247.4	238.2	4.82	22	1.000
15	5.7	269.1	259.4	9.31	19	0.105
16	5.5	256.2	246.7	7.26	18	0.556
17	5.1	257.3	251.5	11.29	92	0.185
18	5.1	252.4	246.7	9.34	104	0.952
19	5.0	260.4	253.8	9.18	42	0.048
20	4.9	259.9	254.1	9.19	77	0.065
21	4.9	256.4	249.8	8.89	36	0.444
22	4.8	251.1	245.8	9.68	132	0.970
23	4.8	256.6	250.1	10.39	38	0.158
24	4.8	260.0	253.8	10.65	48	0.000
25	4.7	253.4	247.8	8.05	75	0.587
26	4.7	256.5	247.6	11.03	15	0.667
27	4.6	260.6	255.4	11.63	109	0.257
28	4.6	262.5	257.1	9.71	73	0.041
29	4.5	256.6	250.9	8.62	48	0.188
30	4.5	259.7	253.3	8.57	31	0.000
31	4.5	260.7	255.1	7.98	52	0.019
32	4.5	246.0	240.9	6.45	91	1.000
33	4.5	262.8	257.9	7.61	145	0.048
34	4.5	250.7	245.0	8.44	48	0.646
35	4.4	265.0	259.7	9.15	67	0.015
36	4.4	261.7	256.6	9.62	91	0.077
37	4.4	258.5	253.5	8.30	90	0.022
38	4.3	255.0	236.6	11.11	4	1.000
39	4.3	255.5	250.3	9.05	57	0.316
40	4.2	261.8	256.0	10.25	36	0.028
41	4.2	252.2	247.5	8.76	110	0.427
42	4.2	255.9	250.3	9.67	42	0.024
43	4.2	263.4	258.6	9.18	86	0.023
44	4.1	255.7	250.7	7.54	58	0.103
45	4.1	260.6	255.2	8.53	40	0.125
46	4.1	249.3	242.5	9.04	20	1.000

Table B-1 (cont.)

100 Schools with Highest Adjusted Achievement Differential Values

School Rank	Adj. $\bar{d}$	Mean Score		Std. Dev'n of d's	No. of Students	Proportion Non-White
		Actual	Predicted			
47	4.1	259.3	253.2	9.63	26	0.077
48	4.0	254.3	247.6	11.61	20	0.550
49	4.0	247.6	242.8	6.08	68	0.265
50	4.0	260.7	256.1	9.48	94	0.128
51	4.0	262.0	257.4	8.66	79	0.025
52	4.0	260.2	251.9	12.71	12	0.167
53	4.0	261.5	257.0	8.75	98	0.010
54	4.0	258.5	252.3	7.97	24	0.042
55	3.9	246.6	242.0	7.36	77	0.987
56	3.9	263.4	258.7	9.52	65	0.000
57	3.9	260.4	255.7	7.62	59	0.017
58	3.9	255.2	247.1	11.96	12	0.583
59	3.9	259.7	255.2	9.46	79	0.215
60	3.8	259.9	255.6	9.23	100	0.020
61	3.8	255.5	249.3	9.83	22	0.227
62	3.8	249.3	245.0	8.47	89	0.854
63	3.8	265.2	260.4	10.69	53	0.075
64	3.8	261.4	257.0	9.45	83	0.072
65	3.8	252.6	247.4	11.02	37	0.432
66	3.8	257.2	253.1	8.05	133	0.188
67	3.8	258.2	252.1	11.97	21	0.048
68	3.8	261.4	257.0	8.96	75	0.040
69	3.8	257.5	251.3	8.49	20	0.000
70	3.7	259.0	254.3	7.54	49	0.041
71	3.7	258.9	253.7	10.72	35	0.114
72	3.7	256.2	251.6	9.83	56	0.125
73	3.7	243.9	237.8	8.39	21	1.000
74	3.7	262.2	257.7	10.12	64	0.047
75	3.7	264.2	260.1	9.64	154	0.026
76	3.7	259.4	254.6	8.88	46	0.152
77	3.7	258.0	253.5	9.47	61	0.131
78	3.7	245.2	240.8	6.71	63	0.937
79	3.7	259.0	255.0	9.59	143	0.133
80	3.7	260.0	255.8	10.26	99	0.081
81	3.7	260.6	256.4	8.83	89	0.022
82	3.6	257.1	252.2	8.82	39	0.128
83	3.6	259.1	255.0	8.73	95	0.105
84	3.6	242.2	235.3	4.57	14	1.000
85	3.6	255.5	250.8	8.57	43	0.140
86	3.6	252.6	248.5	8.08	75	0.720
87	3.5	263.0	259.1	10.49	139	0.043
88	3.5	257.4	253.3	8.88	77	0.039
89	3.5	256.7	252.2	9.07	46	0.043
90	3.5	255.8	251.3	8.80	47	0.064
91	3.5	247.0	240.8	8.20	17	0.941
92	3.5	262.7	257.5	9.82	26	0.038

Table B-1 (cont.)

100 Schools with Highest Adjusted Achievement Differential Values

School Rank	Adj. $\bar{d}$	Mean Score		Std. Dev'n of d's	No. of Students	Proportion Non-white
		Actual	Predicted			
93	3.5	253.0	247.1	8.94	19	0.211
94	3.5	262.5	258.3	8.75	63	0.032
95	3.5	261.3	257.2	9.62	69	0.029
96	3.5	257.1	251.6	11.89	23	0.261
97	3.5	258.0	254.3	8.90	180	0.133
98	3.4	261.4	257.1	11.47	56	0.089
99	3.4	265.0	254.1	9.00	6	0.000
100	3.4	259.7	251.2	12.88	9	0.000

Table B-2

100 Schools with Lowest Adjusted Achievement Differential Values

School Rank	Adj. d	Mean Score		Std. Dev'n of d's	No. of Students	Proportion Non-white
		Actual	Predicted			
1	-5.8	234.0	245.0	5.11	15	0.933
2	-5.8	234.9	242.4	6.59	44	0.977
3	-5.1	231.1	241.4	7.63	13	1.000
4	-4.9	231.0	237.9	5.68	33	0.909
5	-4.7	242.2	250.8	8.73	22	0.273
6	-4.6	244.3	250.1	8.59	56	0.321
7	-4.5	242.6	248.8	7.07	37	0.162
8	-4.5	233.0	239.8	6.68	26	0.923
9	-4.5	246.4	253.6	9.31	23	0.043
10	-4.4	242.8	249.1	5.03	31	0.419
11	-4.4	236.3	242.1	6.31	42	0.810
12	-4.4	236.5	242.6	7.24	33	0.970
13	-4.3	235.8	240.4	6.66	178	0.994
14	-4.3	248.9	254.2	8.79	60	0.117
15	-4.2	243.1	248.4	7.91	52	0.308
16	-4.2	245.3	250.0	8.73	94	0.106
17	-4.1	244.7	250.2	7.98	42	0.190
18	-4.1	233.6	239.3	6.36	36	1.000
19	-4.1	243.6	248.2	7.24	100	0.440
20	-4.1	246.8	252.7	11.45	31	0.000
21	-4.1	245.9	250.6	7.61	81	0.259
22	-4.0	247.7	253.3	7.66	34	0.118
23	-4.0	232.6	238.6	4.81	29	1.000
24	-4.0	246.7	251.5	7.80	70	0.057
25	-4.0	244.0	250.3	9.21	24	0.042
26	-4.0	245.6	250.5	9.21	62	0.177
27	-4.0	240.3	245.9	7.89	33	0.091
28	-4.0	248.3	253.2	9.58	61	0.164
29	-4.0	235.1	241.4	4.20	24	0.958
30	-4.0	234.3	239.1	6.27	65	1.000
31	-3.9	246.3	251.0	7.55	75	0.187
32	-3.9	246.8	251.6	9.39	58	0.069
33	-3.9	244.9	252.3	6.62	15	0.067
34	-3.9	236.9	241.9	7.23	47	0.936
35	-3.8	243.2	248.0	7.22	51	0.039
36	-3.8	234.4	239.1	7.95	54	1.000
37	-3.8	238.8	243.5	5.90	54	0.963
38	-3.8	248.6	253.4	6.93	45	0.000
39	-3.7	247.4	252.4	8.42	38	0.237
40	-3.7	242.0	247.1	6.72	37	0.189
41	-3.6	250.0	254.3	8.88	69	0.145
42	-3.6	234.3	239.4	5.24	32	1.000
43	-3.6	238.7	242.7	6.71	114	0.982
44	-3.6	241.0	245.5	7.08	55	0.800
45	-3.6	238.8	243.0	5.99	71	0.986
46	-3.6	237.5	242.2	5.74	44	0.977

Table B-2 (cont.)

100 Schools with Lowest Adjusted Achievement Differential Values

School Rank	Adj. d	Mean Score		Std. Dev'n of d's	No. of Students	Proportion Non-white
		Actual	Predicted			
47	-3.6	251.0	255.3	9.37	68	0.147
48	-3.5	236.2	240.3	4.86	86	0.965
49	-3.5	241.7	246.6	8.96	35	0.029
50	-3.5	242.8	248.3	6.86	26	0.423
51	-3.5	235.9	240.2	5.62	66	0.970
52	-3.5	243.3	248.5	8.15	29	0.345
53	-3.5	243.7	249.2	7.99	25	0.040
54	-3.5	245.8	249.9	8.38	80	0.425
55	-3.5	238.4	243.3	8.71	34	0.912
56	-3.5	241.3	245.6	6.22	54	0.537
57	-3.5	247.4	251.5	7.23	75	0.133
58	-3.4	247.7	251.9	7.93	66	0.227
59	-3.4	243.7	248.3	6.12	40	0.400
60	-3.4	245.0	249.5	10.06	41	0.024
61	-3.4	250.0	255.0	7.76	27	0.111
62	-3.4	247.2	251.3	8.28	63	0.095
63	-3.3	247.5	251.5	8.45	68	0.162
64	-3.3	235.1	239.8	7.24	35	0.914
65	-3.3	235.8	239.9	6.77	61	0.951
66	-3.3	249.2	254.6	10.39	22	0.182
67	-3.3	233.2	239.0	6.38	18	0.944
68	-3.3	239.9	245.6	6.46	19	0.842
69	-3.3	249.3	253.1	11.09	87	0.184
70	-3.3	236.6	240.5	5.89	71	0.972
71	-3.3	239.9	244.8	5.99	28	0.893
72	-3.3	244.2	248.1	7.38	66	0.258
73	-3.3	234.4	239.5	5.66	24	1.000
74	-3.3	239.0	243.1	6.12	53	0.869
75	-3.2	232.9	237.7	4.30	27	1.000
76	-3.2	233.2	236.9	4.11	87	0.954
77	-3.2	243.8	248.0	7.67	47	0.511
78	-3.2	241.6	246.6	8.56	25	0.280
79	-3.2	233.7	237.5	5.19	80	0.938
80	-3.2	233.1	237.1	5.51	54	0.944
81	-3.2	246.3	251.8	7.98	19	0.158
82	-3.2	244.6	249.1	7.91	34	0.059
83	-3.2	244.7	250.6	6.47	16	0.063
84	-3.2	235.9	239.6	6.96	89	0.966
85	-3.1	248.2	253.1	8.32	25	0.040
86	-3.1	249.5	253.3	8.28	59	0.169
87	-3.1	249.7	253.4	8.84	82	0.220
88	-3.1	243.6	247.5	10.56	56	0.643
89	-3.1	234.5	238.4	5.68	55	0.964
90	-3.1	235.4	239.1	5.21	76	0.961
91	-3.1	252.6	257.2	10.30	30	0.033
92	-3.1	239.4	243.2	6.06	63	0.984

Table B-2 (cont.)

100 Schools with Lowest Adjusted Achievement Differential Values

School Rank	Adj. $\bar{d}$	Mean Score		Std. Dev'n of d's	No. of Students	Proportion Non-white
		Actual	Predicted			
93	-3.1	241.4	245.4	6.61	49	0.980
94	-3.1	241.0	245.2	7.72	40	0.750
95	-3.1	245.0	248.4	8.59	123	0.382
96	-3.1	243.9	247.8	7.49	53	0.283
97	-3.1	244.9	248.7	8.97	60	0.083
98	-3.1	234.1	238.8	5.45	25	1.000
99	-3.1	242.6	246.6	6.58	45	0.356
100	-3.1	244.3	248.0	7.49	61	0.377

Table B-3

50 School Districts with Highest 6th Grade Adj. Achievement Differential Values

Rank	Adj. $\bar{d}$	Predicted Score	n	Proportion Non-white	Rank	Adj. $\bar{d}$	Predicted Score	n	Proportion Non-white
1.[1/]	7.93	240.94	67	.985	26.	3.35	247.59	20	.550
2.	7.88	238.35	34	1.000	27.	3.30	251.10	68	.132
3.[1/]	5.24	240.80	110	.918	28.	3.28	239.70	48	.958
4.	5.03	245.55	78	.397	29.	3.21	255.91	401	.072
5.	4.98	250.56	72	.167	30.	3.15	240.35	88	.955
6.	4.60	252.87	55	.018	31.	3.13	252.06	21	.048
7.	4.46	246.70	18	.556	32.	3.04	252.84	57	.105
8.	4.37	247.83	75	.587	33.	3.02	256.11	351	.085
9.	4.31	247.77	132	.394	34.	3.00	253.06	207	.053
10.	4.22	257.10	73	.041	35.	2.95	252.03	870	.376
11.	4.11	253.46	90	.022	36.	2.94	245.18	819	.919
12.	4.01	245.01	48	.646	37.	2.91	255.15	188	.027
13.	3.89	251.83	156	.263	38.	2.87	259.00	415	.029
14.	3.84	252.86	73	.000	39.	2.85	240.80	17	.941
15.	3.77	247.63	15	.667	40.	2.83	253.31	122	.238
16.	3.71	257.46	359	.022	41.	2.74	246.13	15	.667
17.	3.67	250.80	26	.154	42.	2.73	253.80	683	.130
18.	3.58	260.11	154	.026	43.	2.70	255.33	639	.141
19.	3.53	242.48	593	.961	44.[1/]	2.68	236.90	144	.993
20.	3.48	257.23	345	.052	45.	2.60	253.51	90	.056
21.	3.46	255.57	94	.043	46.	2.58	245.94	24	.208
22.	3.42	245.12	102	.843	47.	2.55	254.98	847	.126
23.	3.41	255.30	158	.038	48.	2.55	249.30	46	.152
24.	3.39	258.75	478	.036	49.	2.53	254.96	286	.073
25.	3.37	251.83	251	.247	50.	2.49	252.44	219	.215

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Table B-4

25 School Districts with Lowest 6th Grade Adj. Achievement Differential Values

Rank	Adj. $\bar{d}$	Predicted Score	n	Proportion Non-white
1.	-4.65	240.55	139	.978
2.	-3.95	244.70	61	.230
3.	-3.86	249.22	630	.388
4.	-3.77	242.65	33	.970
5.	-3.70	251.48	70	.057
6.	-3.39	242.71	114	.982
7.	-3.28	240.18	134	.955
8.	-3.25	253.25	142	.197
9.	-3.15	243.11	246	.602
10.	-3.03	240.53	71	.972
11.	-2.89	246.26	207	.478
12.	-2.82	240.23	96	.990
13.	-2.81	245.01	123	.236
14.	-2.79	239.08	37	.892
15.	-2.78	248.47	248	.242
16.	-2.76	246.29	264	.352
17.	-2.70	250.39	126	.135
18.	-2.68	240.99	99	.980
19.	-2.67	239.12	173	.838
20.	-2.67	240.75	87	.713
21.	-2.61	242.45	254	.697
22.	-2.58	238.85	25	1.000
23.	-2.57	237.91	70	1.000
24.	-2.55	237.68	89	.955
25.	-2.52	251.22	168	.298